

PSYCHE.

NOTES ON THE WINTER INSECT FAUNA OF VIGO COUNTY, INDIANA,—I.

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One of the greatest problems which each of the living forms about us has had to solve during the years of its existence on earth is how best to perpetuate its kind during that cold season which once each year, in our temperate zone, is bound to come. Many are the solutions to this problem. Each form of life has, as it were, solved it best to suit its own peculiar case, and, to the earnest student of nature, there is nothing more interesting than to pry into these solutions and note how varied, strange and wonderful they are.

As far as I can ascertain but little has as yet been written concerning the winter habits of insects, and yet every one of the 30,000 or more species known to inhabit North America survives the cold season in some form.

At present I have a knowledge of but two papers that have been written on the subject.* One, "On Winter

Collecting," by H. T. Fay, was published in the Proc. Ent. Soc. Phil., 1862, v, 194, in which 129 species of beetles were listed as having been taken during the winter months in the vicinity of Columbus, Ohio. This paper I have never seen and have a knowledge of it only through Psyche.† The other, "Our Winter Beetles," by H. F. Wickham, appeared in the Canadian Entomologist, xxiv, 1892, 99, in which 33 species are mentioned as having been noted near Iowa City, Iowa.

Dr. A. S. Packard, in his "Entomology for Beginners," p. 41, makes the following statement:—

"During the winter the species (of insects) in most cases are represented by the egg alone. *Rarely does the mature insect hibernate*,‡ though one will find a few ichneumons, beetles, and bugs under leaves and the bark of trees; but in many species, especially moths, the pupa hibernates to disclose the imago in the spring or early summer. Larvæ seldom live through the winter, although there are some well known exceptions to this law."

In January, 1891, I began to collect the Coleoptera and the Hemiptera—

* Since writing the above I have, through the kindness of Mr. S. H. Scudder, been enabled to examine a rare and little known paper which was published by Dr. Asa Fitch (Am. Journ. Sci. Agric., v, 1846, 274), on "Winter Insects of Eastern New York." In it Dr. Fitch describes as new and gives the habits of the following eight species of insects which he found quite common in winter in the locality mentioned: *Boreus nivoriundus*, *B. brumalis*, *Perla nivicola*, *Nemoura nivalis*, *Culex hyemalis*, *Chironomus nivoriundus*, *Trichocera brumalis* and *Podura nivicola*. With the exception of the last, these belong to the orders *Neuroptera* and *Diptera*, the members of which I did not collect.

† October, 1891, 162.

‡ The italics are mine.

Heteroptera found in Vigo County, Indiana, and to keep full accession notes of the species of those two orders as well as of the Orthoptera which I had been collecting for some years.

In November, 1893, I conceived the idea of preparing a paper on the insects of the three orders mentioned which I found either as adults or nymphs (active young) of Orthoptera and Hemiptera in the winter months of December, January and February. I had intended to collect during the present winter and prepare the paper as the result, mainly, of the two winters' (1893-'94 and 1894-'95) collecting, but having moved from the county before December, 1894, I shall have to base it upon the former winter's collecting and such accession notes as I took before I began a systematic search for winter insects.

The Orthoptera taken are noted in the present paper. The Hemiptera-Heteroptera (about 65 species), and the Coleoptera (between 250 and 300 species) will be treated of in future articles.

ORTHOPTERA.

BLATTIDÆ.

Of the six species of this family known to occur in the county four have been taken in winter. Of these *Phyllodromia germanica* (L.), the Croton bug, is very abundant in all stages about the older hotels and boarding houses of the city of Terre Haute. On Dec. 16, 1893, 30 adult specimens and fully half that number of young were taken in less than ten minutes in

the kitchen of one of the hotels. Two of the adults were females with oötheca protruding.

Periplaneta orientalis (L.) is less common and I have seen only half grown nymphs in the winter months. It is most frequent in bakeries and about old tenements.

The other two species, *Ischnoptera unicolor* (Scudder), and *I. pennsylvanica* (De Geer), occur only in the country. They are usually found in company but the former is scarce while the latter is the most common insect noticeable in the woods in winter. One cannot pull the loose bark from an old log without dislodging a colony of from ten to a hundred of the nymphs of various sizes. Cold has seemingly but little effect upon them as they scramble away almost as hurriedly when their protective shelter of bark is removed on a day in mid-January with the mercury at zero as they do in June when it registers a hundred in the shade. The adults of these two species occur only from about May 12 to October. The nymphs of the two are distinguishable by color alone. *Ectobia flavocincta* Scudder and *Tennopteryx deropeltiformis* Brunner are found in the county and probably pass the winter in the nymph stage, but I have not been able to identify them with certainty at that season. I might add here that an adult male of *Periplaneta americana* as well as two nymphs were seen in a hotel in Indianapolis on Jan. 15, thus proving that that insect passes the winter in all stages.

ACRIDIDÆ.

Of the 38 species of this family occurring in the county 10 are to be found in the winter season, the others being then represented by the eggs alone. Seven of the ten belong to the subfamily of *Tettiginae* or Grouse Locusts. Five of these, namely: *Tettix arenosus* Burm., *T. ornatus* Say, *T. granulatus* Kirby, *Tettigidealateralis* Say, and *polymorpha* Burm., are found in the mature state only. During severe cold weather they ensconce themselves beneath the loose bark of logs, piles of decaying leaves, the radical leaves of mullein (*Verbascum thapsus* L.), or the bottom rails of the old and fast disappearing Virginia rail fences. From these retreats every warm, sunny day tempts them forth in numbers, and, on such occasions, the earth seems to swarm with them as they leap before the intruder, their hard bodies striking the dead leaves with a sound similar to that produced by falling hail.

Batrachidea cristata Harris occurs sparingly in winter both as nymphs and adults in like situations; while *Tettix cucullatus* Burm. has been taken only in the various larval stages, usually beneath logs in sandy soil near water. The two species of *Tettigidea* are gregarious in winter, as many as 11 specimens having been found within a space of six square inches on the side of an overturned log.

The winter species of Acrididæ other than those mentioned are *Chortophaga*

viridifasciata (De Geer), both brown and green forms; *Arphia sulphurea* Fab., and *Hippiscus tuberculatus* Pal. de Beauv., all of which are found only as larvae or pupa. The first two are very common in the county, and the young of *Arphia sulphurea* are often very prettily mottled with lichen-like, grayish markings — a character which I have never seen in the adult. These three species in winter frequent dry, open woods and roadsides and are very active on all sunny days when the mercury rises above the freezing point; often climbing or leaping upon the lower rails of fences or sides of stumps and there resting in and apparently enjoying the sunshine.

LOCUSTIDÆ.

The young of one or two species of *Ceuthophilus* are the only winter representatives known to me of the 34 species of this family which I have taken in the county. Specimens varying much in size have been taken singly on a number of occasions in each of the winter months — usually from beneath logs deeply buried in decaying leaves and vegetable mold. I have kept examples of them in confinement for some weeks in winter but they invariably died before reaching maturity. The young of the different species are difficult to separate; but judging mainly from color characters, most, if not all, of the winter specimens were *C. blatchleyi* Scudder, the most common species in western Indiana.

GRYLLIDAE.

Since my paper on the "Gryllidae of Indiana"* appeared, seven additional species have been taken, so that now 22 are known to occur in Vigo County. From what is known of the life history of the mole crickets, the two species, *Gryllotalpa borealis* Burm., and *G. columbia* Scudder, undoubtedly exist through the winter in the larval stage, though I have never happened upon them in that season.

A careful study of the members of the genus *Gryllus* during the last three years has developed the fact that 4 species, namely: *G. neglectus* Scudder, *abbreviatus* Serville, *pennsylvanicus* Burm., and *luctuosus* Serville inhabit the county. The last two may be different forms of the same species, but

that the first 3 are distinct, there is, to my mind, no doubt.

Of these, the eggs of *neglectus* and *pennsylvanicus*, and probably those of *luctuosus*, hatch in autumn, and the young in numbers may be found beneath logs, rails, and other protective cover during the entire winter. Often as many as a dozen are sheltered beneath the same object, each at the bottom of a cone-shaped pit, quite similar to the one made in loose sand by the larva of the ant lion, *Myrmeleon obsoletus* Say.

G. neglectus reaches maturity as early as May 5th, the males having been heard chirping on that date. *Pennsylvanicus* and *luctuosus* are full grown about the 25th of May, while the adults of *abbreviatus*, from eggs hatched in spring, do not occur until the last week in July.

EGGS OF THE LONG-NOSED OX-LOUSE, *HAEMATOPINUS VITULA* L.

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Professor Osborn says in his monograph "Pedicula and Mallophaga affecting Man and the Lower Animals" (Bull. 7, Div. Ent. U. S. Dept. Agric. p. 18) "that the eggs of this species have not been described, and we have not had the good fortune to discover them." Having been more fortunate we are able to submit the following

account of the eggs of this species. The Long-nosed ox-lice has been quite bad this winter in herds in the vicinity of Thomaston, Me. At our request Mr. A. W. Batchelder of Thomaston collected some hair from the infested animals, and upon this we found *three egg-shells* with the operculum off, but the form, sculpture, manner and place of attachment to the hairs seemed perfect.

* Proc. Ind. Acad. Sci., 1891.